DELTA DESIGN INC.

7650

INSTRUCTION MANUAL

DELTA DESIGN, INC.
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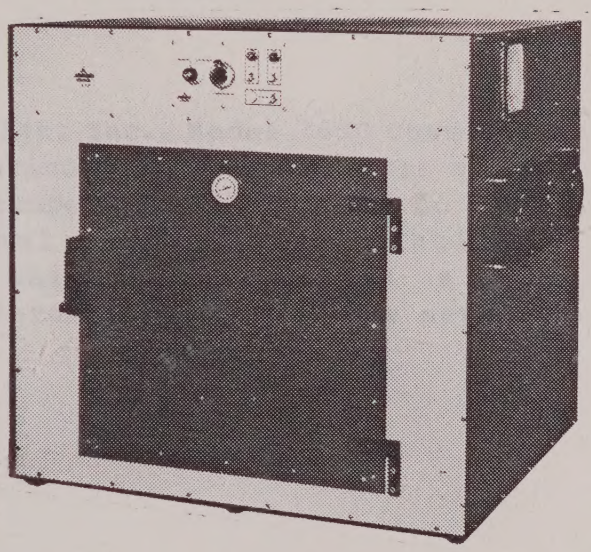
INSTRUCTION MANUAL
Model 7650



DELTA DESIGN
INC.

ENVIRONMENTAL TEST CHAMBER

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ENVIRONMENTAL CONTROL EQUIPMENT FOR RESEARCH AND INDUSTRY
5775 KEARNY VILLA ROAD SAN DIEGO, CALIFORNIA 92123

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FOREWORD

The Delta Design, Inc., Model 7650 Chamber is a precision environmental test chamber capable of attaining temperatures from -73°C to +315°C with a minimal temperature deviation of ±0.1°C. The chamber incorporates a Delta Design temperature controller (see separate manual).

WARRANTY

Delta Design, Inc. warrants all products it manufactures and sells against defective material and workmanship for a period of 90 days from the date of our shipment. Temperature chambers and electronics are warranted for one year from the date of our shipment. All contactor assemblies are warranted for a period of 90 days or 1/2 million cycles.

Obligation under this warranty is limited to repair at the factory (5775 Kearny Villa Rd., San Diego, CA 92123) or one of our authorized service stations, or at our option, replacement of any product Delta Design determines to be defective or not in accord with stated specifications. All replacement parts will be invoiced and credit issued upon acceptance of defective part.

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All products to be returned to Delta's plant for warranty repair must have prior approval from Delta Design, Inc. Delta Design will not accept liability for any unauthoried returns. Transportation for the return of the repaired equipment to the customer shall be prepaid by Delta Design. Delta Design will not allow any credit for repairs or alterations to its products, and Delta Design shall in no event assume any responsibility for repairs or alterations made other than by Delta Design. Any products repaired or replaced under this Warranty will be warranted for the balance of the warranty period remaining with respect to the original purchased product.

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No liability will be accepted for any damages to customer's materials and equipment due to the use or misuse of Delta's products, nor for any loss of profits or other special damages.

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Specifications remain subject to change to allow the introduction of design improvements.

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CHAPTER 1
SAFETY AND GENERAL INFORMATION

1.1 SAFETY.

Before attempting to operate, maintain, troubleshoot, or repair any part of the chamber, personnel should become familiar with the contents of this manual.

1.2 SCOPE.

This manual provides information necessary to operate, maintain, and repair the Delta Model 7650 Environmental Temperature Chamber, also referred to as the chamber.

1.3 FUNCTIONAL DESCRIPTION.

1.3.1 The Model 7650 is a precision environmental temperature chamber having a stainless steel interior, aluminum outer case and glass fiber insulation.

1.3.2 The chamber is equipped with a Delta Design Temperature Controller (see separate manual). Closed air circulation is provided by 140 CFM blowers. The chamber is heated by applying full wave power to bobbin wound nichrome heating elements via the heat switch. The chamber is cooled by injecting liquid CO_2 (or liquid nitrogen in LN_2 models) into the air stream through an expansion nozzle. A solenoid valve controlled by the COOL solid state switch meters coolant flow.

1.4 REFERENCE DATA.

General chamber specifications and other reference data are provided in Table 1-1.

TABLE 1-1. CHAMBER SPECIFICATIONS AND REFERENCE DATA

TEST VOLUME (H x W x D)	20" x 20" x 25" (50.80 x 50.80 x 63.50 Cm) 5.78 FT^3 (163.7 liters)
AIR CIRCULATION	Six 140-CFM centrifugal blowers with baffling to provide equal distribution throughout the chamber in a horizontal air flow pattern.
OUTSIDE CASE DIMENSIONS (H x W x D)	32-1/4" x 34-1/4" x 33-1/2" (81.92 x 87.00 x 85.09 Cm)
INNER LINER	Type 302 Stainless Steel
OUTER CASE	Aluminum
INSULATION	Fiberglass
WEIGHT	265 Lbs. (120.20 Kg)
POWER REQUIREMENTS	240 VAC, 50/60 Hz Single Phase, 20 Amp, 4.75 kW; or 208 VAC, 50/60 Hz, Single Phase, 20 Amp, 4.75 kW.
HEATING ELEMENTS	Six 720-Watt elements, total of 4,320 Watts, nichrome wire
COOLING	Liquid Carbon Dioxide (LCO_2) or Liquid Nitrogen (LN_2)
LINE VOLTAGE STABILIZATION	±0.5°C for 220 to 240 VAC Line Voltage Change ±0.5°C for 200 to 215 VAC Line Voltage Change

TABLEL 1-1. (CONT.)

AMBIENT TEMPERATURE COMPENSATION	±0.02°C/°C
GRADIENT IN TEST AREA (1-1/2" from walls in corners and in the center of the test area.)	±1-1/2°C/100°C Difference, measured from ambient
THERMAL IMPEDANCE OF CHAMBER	Approximately 0.275°C/Watt

CHAPTER 2
INSTALLATION

2.1 UNCRATING AND LOCATION.

Remove all shipping tiedowns and protective packing. Locate the unit so that there is enough clearance on the left hand side of unit to allow adjustment of the failsafe.

2.2 ELECTRICAL CONNECTION.

CAUTION

Chamber must be connected to earth ground.

2.2.1 Standard input power required for the chamber is 240 VAC, 50/60 Hz, single phase, 30 Amps. The optional 208V configuration requires 208 VAC, 50/60 Hz, single phase.

2.2.2 Delta chambers that operate on 240 VAC split the incoming phases for the controller coolant valve solenoid, failsafe relay and blowers. The heater circuit operates on 240 VAC.

2.3 LIQUID COOLANT.

Liquid carbon dioxide (LCO_2) at 900 psi is the standard system. Optional systems are LCO_2 at 300 psi or Liquid Nitrogen (LN_2) at 100 psi.

2.3.1 LIQUID CARBON DIOXIDE (900 psi).

2.3.1.1 Supply. A siphon-type liquid CO_2 bottle is recommended. Test the bottle before use as follows.

1. Release a small amount of LCO_2 into a white handkerchief. Examine the handkerchief for the following.

   a. Any brown stain indicates rust which would clog the filter and valve in the chamber.

   b. A wet handkerchief indicates the presence of water which would either freeze in the presence of water which would either freeze in the valve or clog the injector nozzle.

2. Crack the LCO_2 valve on the cyclinder open and observe the spray, which should be a dense, white cloud. The spray will look thin and gray when the tank is almost empty. An almost empty tank will not give proper cooling and should not be used.

2.3.1.2 Connection. Connect CO_2 supply as follows.

1. Connect the tank of LCO_2 to the rear of the chamber with the high-pressure hose and fittings which are supplied.

2. Place a small amount of sealing compound on the threads of the male fitting to prevent leakage.

CAUTION

Do not let any sealing compound enter the valve inlet on the rear of the chamber.

3. Open the bottle and check for leaks which show as frosty spots on the hose and fittings.

2.3.2 LIQUID CARBON DIOXIDE (300 psi).

2.3.2.1 Supply. When the in-plant use of liquid CO_2 exceeds approximately 1000 pounds per month, a bulk liquid storage system is recommended to reduce coolant cost. Chambers operated with this type of system must be fitted with a different CO_2 valve and injector than used on a 900 psi system. Contact Delta for information concerning valve replacement.

NOTE

A recirculating type bulk storage system is recommended. If not, the supply should be located as close as possible to the chamber to minimize gas formation in the supply line. This is particularly important in low volume usage systems, as insulation and fluid flow prevent boiling of CO_2 in the supply line. Gaseous CO_2 is not an effective coolant.

2.3.2.2 Connection. Blow out all lines, valves and connecting hoses before the chamber is connected. Water is very troublesome and often present in low-pressure refrigerated supplies. If lines are opened to bleed off excessive pressure at shutdown, close them again after bleeding to prevent system contamination by condensed moisture. This will help keep ice from forming in the control valve.

2.3.3 LIQUID NITROGEN.

WARNING

Oxygen in the air surrounding the chamber inner liner and in the insulation can liquify at low temperatures. This could cause a fire hazard in the form of an oxygen-rich atmosphere surrounding the heater area. In addition, any mixture of oil and liquid oxygen can be explosive. Therefore, use extreme care during operation at very low temperatures.

NOTE

The chamber tends to be self-purging, as the nitrogen displaces the usual atmosphere.

2.3.3.1 Supply. A 100-psi valve and stainless steel injector assembly is used for liquid nitrogen applications. LCO_2 from a tank will not operate properly in a chamber equipped for LN_2.

2.3.3.2 Connection. Using an insulated transfer line, connect a liquid nitrogen withdrawal container to the LN_2 input of the chamber. The line should include a relief valve with a relief pressure between 60 and 100 psi for a 2700-cubic foot, 50-psi liquid withdrawal container.

CHAPTER 3
OPERATION

3.1 PRECAUTIONS.

3.1.1 Unplug the chamber from all sources of power before attempting to service or remove the controller chassis.

3.1.2 Do not block the chamber sides or outlet.

3.1.3 Ensure that the correct coolant supply source is connected to the chamber before operating.

3.1.4 Operate the chamber at a temperature of 200°C for an hour after prolonged operation at low temperatures. This restores the insulation efficiency by driving out condensed moisture.

WARNING

Liquid oxygen may be formed in the insulation when the chamber is operated at low temperatures. Any mixture of oil and liquid oxygen can be explosive.

3.1.5 If oil contamination is suspected, bake the empty chamber at 200°C for three hours before taking it to extremely low temperatures.

3.1.6 Do not leave liquid nitrogen trapped in a line (valves closed at both ends). Nitrogen expansion could cause high pressures as the liquid absorbed heat and became gas.

3.2 CONTROLS.

See Figures 2 and 3.

3.3 FAILSAFE ADJUSTMENTS.

Adjust high temperature protection unit (located in chamber left hand side) as follows.

CAUTION

1. Do not rotate the FAILSAFE setting more than one full turn below the temperature trip point, as this could damage the unit.

2. Do not lower failsafe temperature setting unless HEAT switch is on and FAILSAFE is off.

1. Remove the cover plate.

2. Rotate the slotted FAILSAFE control counterclockwise to raise the trip temperature. Rotate the control clockwise to lower the trip temperature.

3. The failsafe setting is preset to 315°C (maximum rating of standard chamber) at the factory. If a lower failsafe temperature setting is desired, operate the chamber at that temperature and adjust the FAILSAFE until it is on the verge of tripping. (Failsafe lamp glows red when failsafe is tripped.)

CHAPTER 4
OPERATOR MAINTENANCE

The chamber should be cleaned periodically to prevent accumulation of dust, debris, or other contaminants that could interfere with chamber accuracy, performance, or safe use.

CHAPTER 5
DRAWINGS AND PARTS LISTS

This chapter provides schematics, assembly drawings and associated parts lists for the chamber and options. The drawings and option kits, listed in Table 5-1, are arranged in numerical order except for the top (chamber) assembly drawing, which appears first. A recommended spares list is provided as Table 5-2. The information presented enables a technician to locate and identify parts to the extent necessary to obtain replacements.

TABLE 5-1. DRAWINGS AND KIT LISTS

NUMBER	TITLE
1655700	Chamber Assy, Model 7650
1637888	Schematic Diagram-208V w/CO_2 & LN_2 Option, 4-wire
1637889	Schematic Diagram-240V w/CO_2 & LN_2 Option, 3-wire
1647407	CO_2 Valve & Bracket Assy
1648610	Schematic Diagram-208V w/CO_2 & LN_2 Option, 3-wire
1655662	Innerliner Assy
1655670	Electrical Chassis Assy
1655698	Kit, 208 VAC Power Option (Parts List only)
1655967	Kit, Cooling, CO_2 High Press w/Type V (Parts List only)
1655968	Kit, Cooling, CO_2 Low Press w/Type V (Parts List only)
1655970	Kit, Cooling, CO_2 High Press and LN_2 w/Type V (Parts List only)
1655971	Kit, Dual Cooling Lo-Press, CO_2 & LN_2 w/Type V (Parts List only)
1655974	Kit, Cooling, LN_2 only w/Type III (Parts List only)

TABLE 5-2. MODEL 7650 RECOMMENDED SPARES LIST

Description	Part Number	Suggested Quantity
Blower Motor	2621006	2
Capacitor, .05MF	0700520-400	1
Capacitor, .1MF	0800007	1
Failsafe Lamp (DS1)	1400082	1
Probe (R1) (Type III Controller only)	2300032	1
Relay	1400218	1
Thermometer	2300011	1
Thermal Switch	1400160	1
Solid State Relay	1400194	1
CO_2 Valve Assembly, 900 psi[1]	1500117	1
CO_2 Valve Assembly, 300 psi[1]	1800105	1

[1]Select one as required for type of system used.

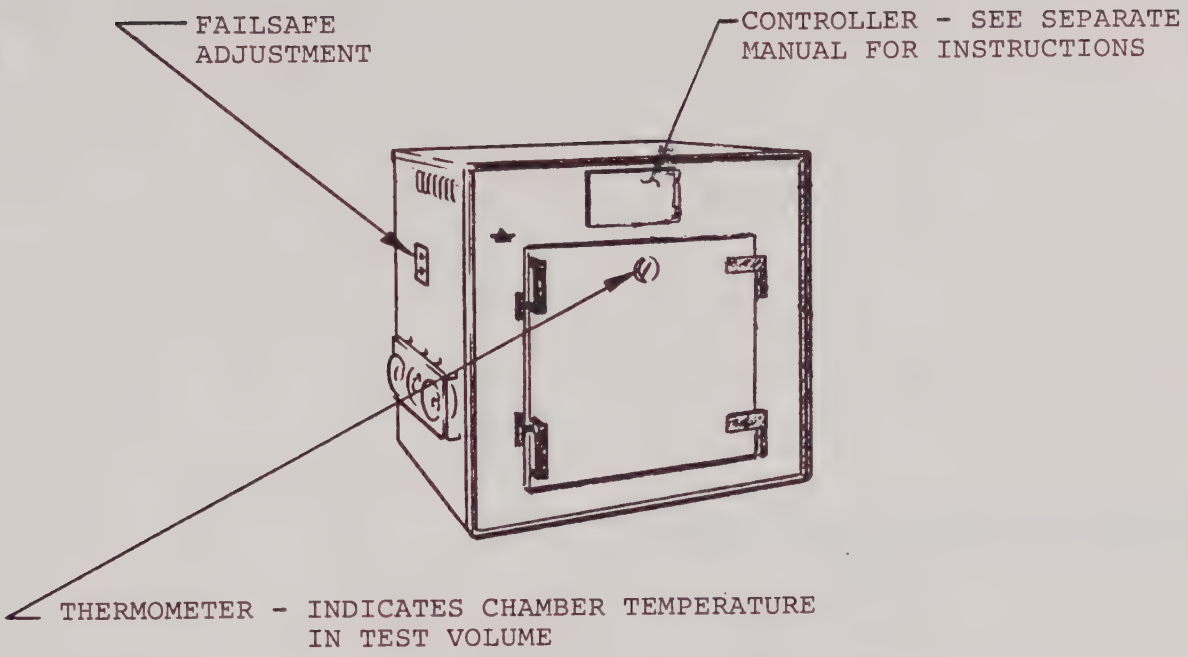


Figure 1. Chamber Controls and Indicators

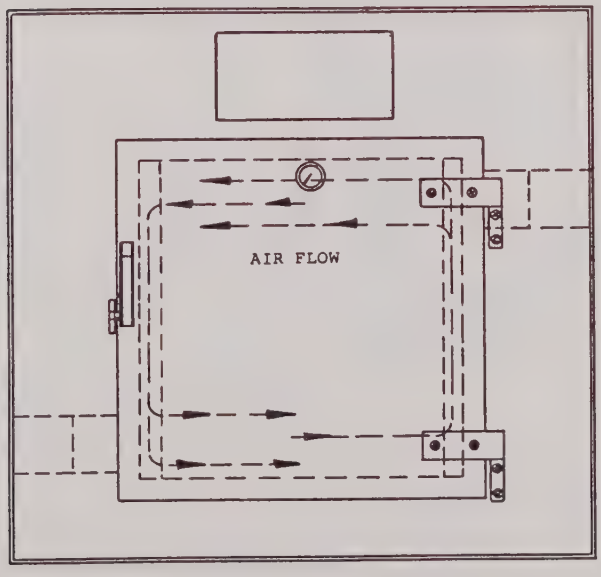


Figure 2. Air Flow Pattern

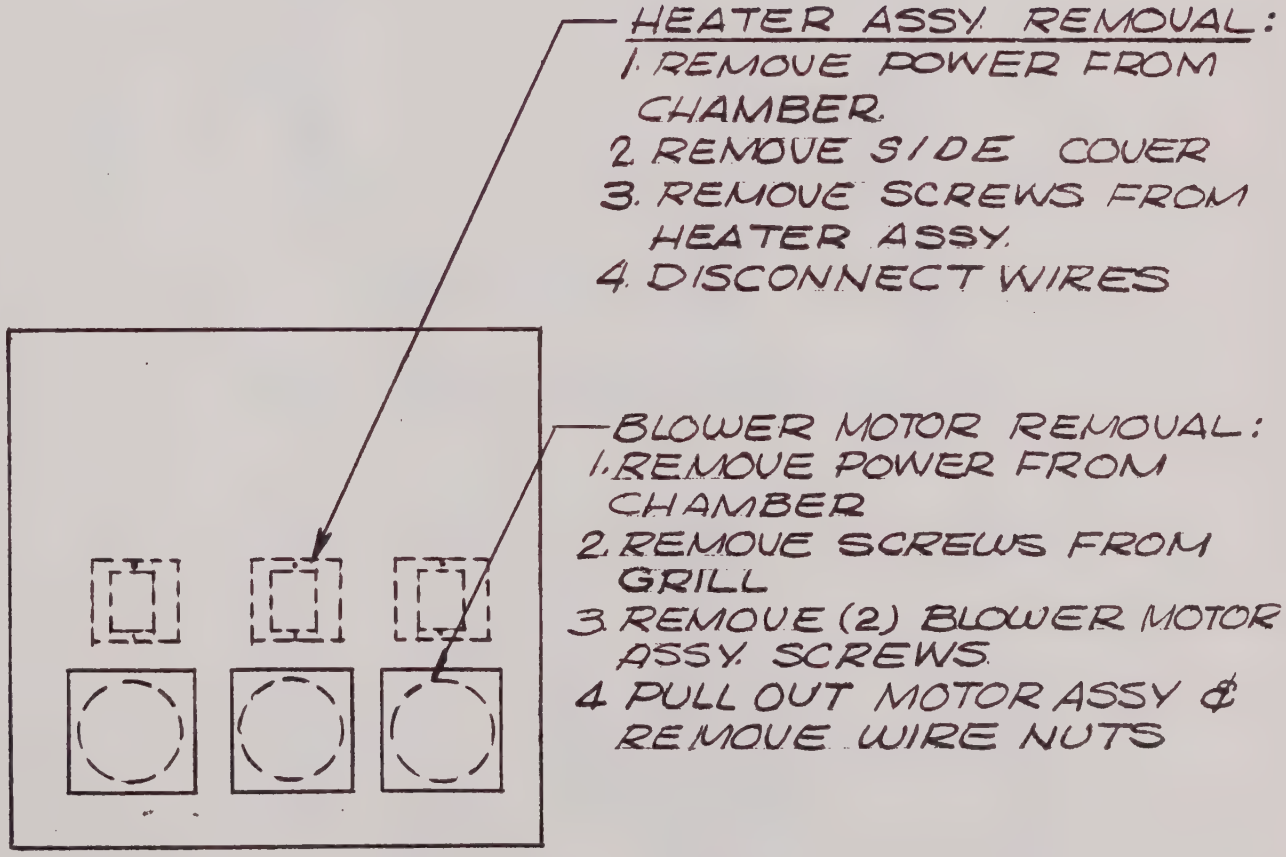

HEATER ASSY. REMOVAL:
1. REMOVE POWER FROM CHAMBER.
2. REMOVE SIDE COVER
3. REMOVE SCREWS FROM HEATER ASSY.
4. DISCONNECT WIRES
BLOWER MOTOR REMOVAL:
1. REMOVE POWER FROM CHAMBER
2. REMOVE SCREWS FROM GRILL
3. REMOVE (2) BLOWER MOTOR ASSY. SCREWS
4. PULL OUT MOTOR ASSY & REMOVE WIRE NUTS

Figure 3. Component Removal (L. H. Side)
(R. H. Side is Similar)

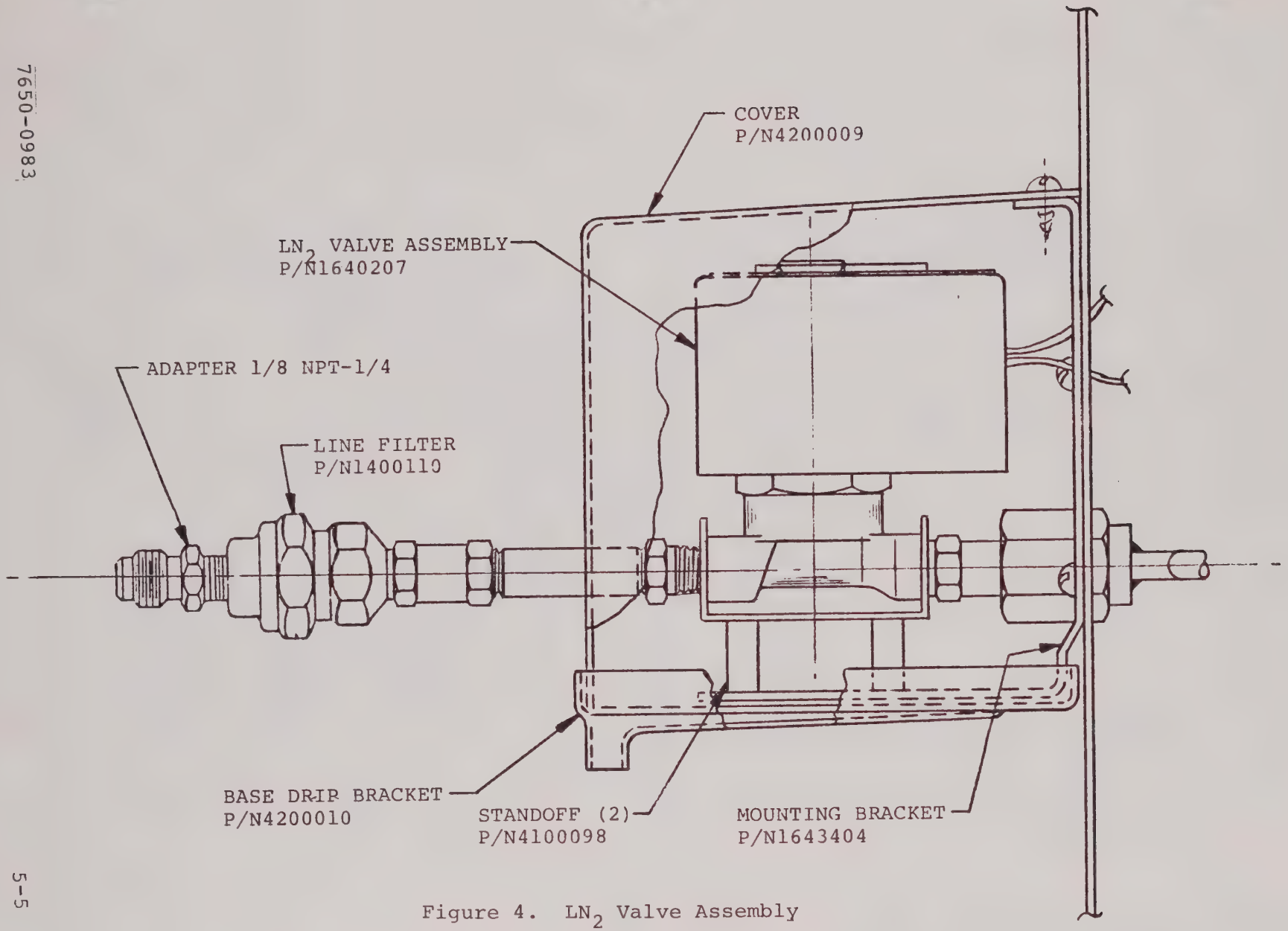
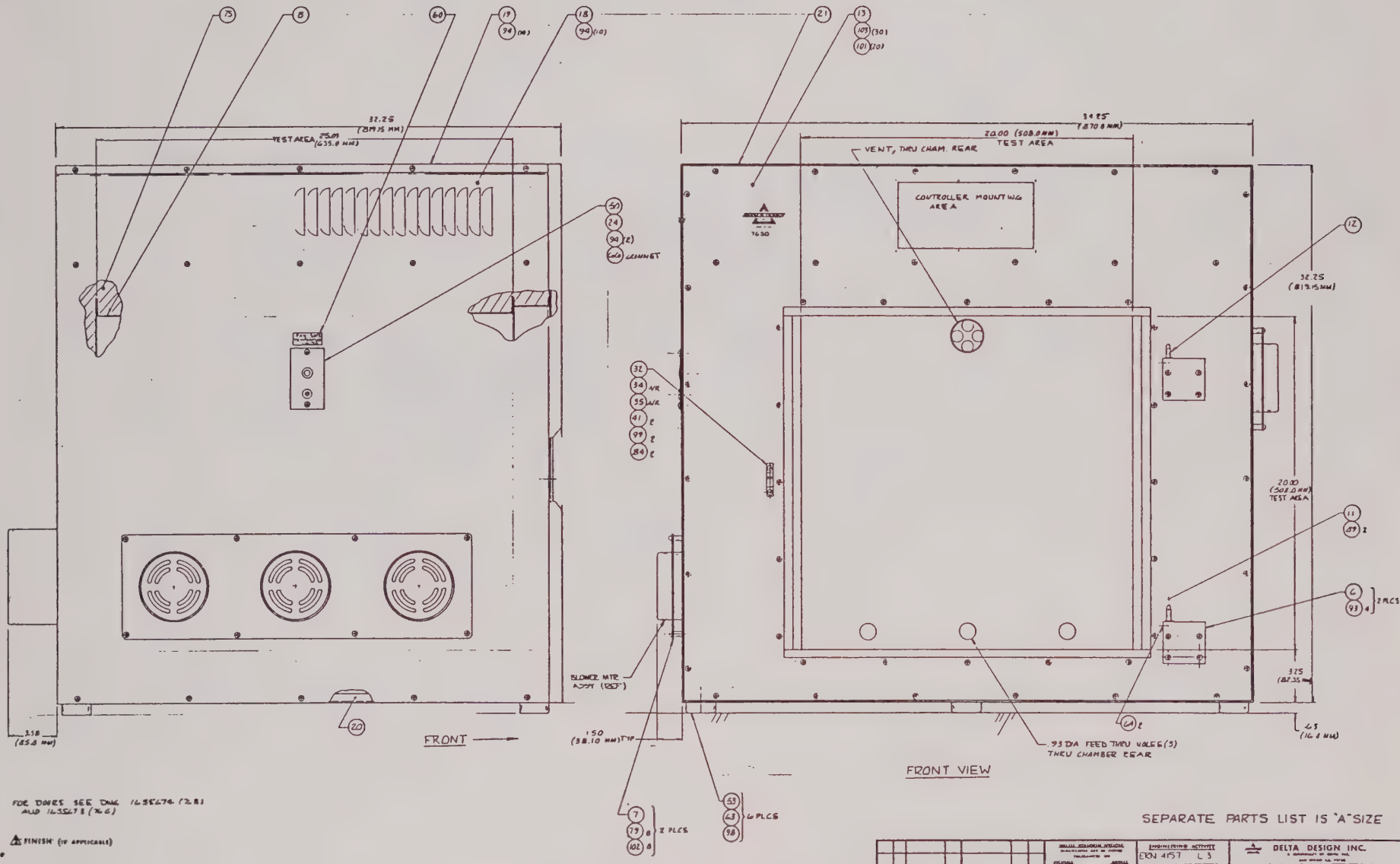


Figure 4. LN_2 Valve Assembly



SEPARATE PARTS LIST IS "A" SIZE

FOR DOMES SEE DWG 1655674 (2.8) AND 1655673 (2.6)

⚠ FINISH (IF APPLICABLE)

⚠ MATL (IF APPLICABLE)

NOTES: UNLESS OTHERWISE SPECIFIED

QTY	ITEM	ASSY									
QTY	NEXT ASSY	ASSY ON	SERIAL NO.	DATE	DWG REV						
APPLICATION		EFFECTIVITY									

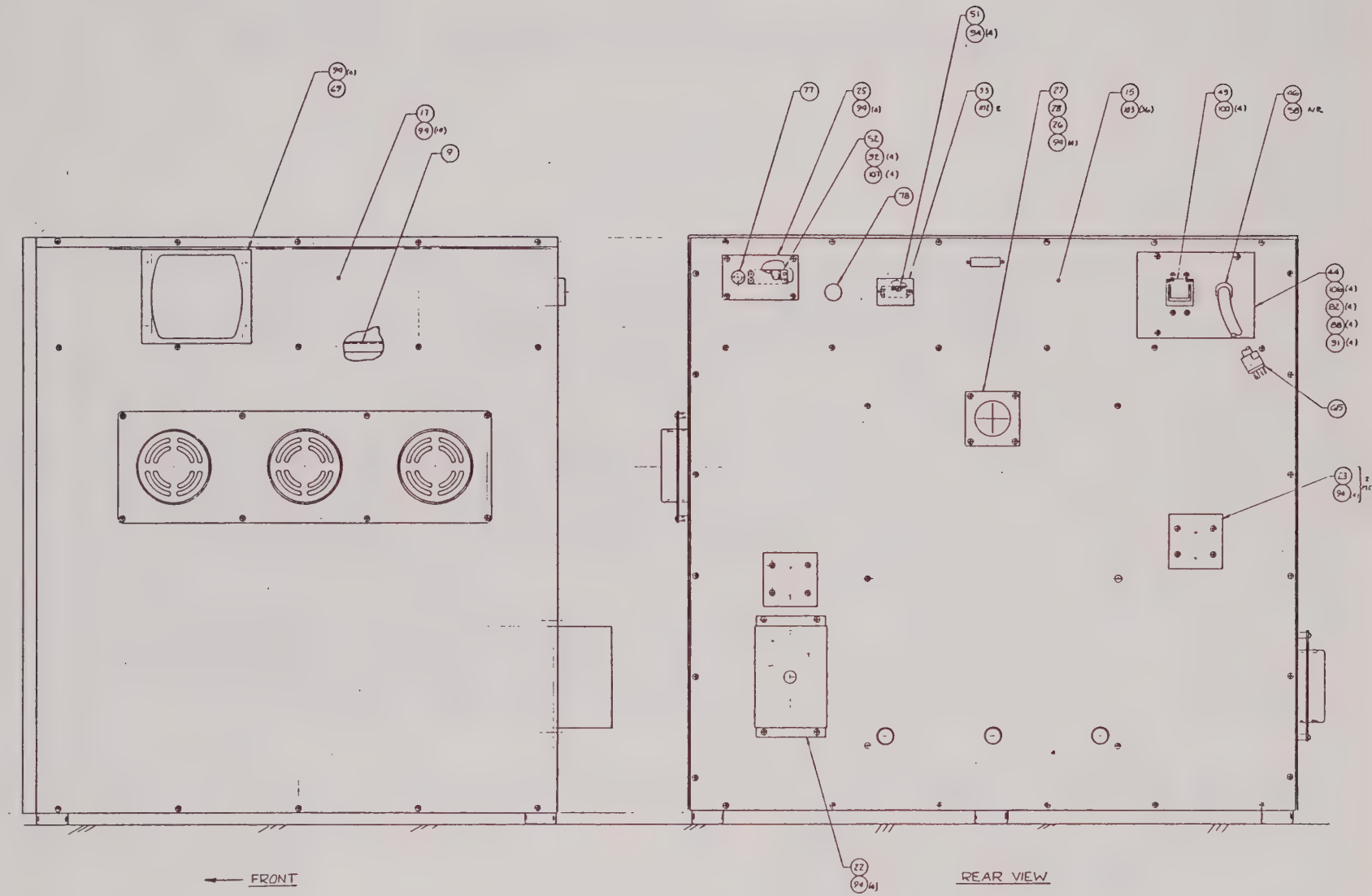
ENGINEERING ACTIVITY	ERN 4157 L 3
DESIGN	
DRAFTING	W. BALL 5-7-15
CHECKED	
APPROV	
RELEASE	
	DO NOT SCALE DWG

DELTA DESIGN INC.

TITLE: CHAMBER ASSY, MODEL 7650

SIZE E | DWG NO. 1655700

SCALE 1:2 | SHEET 1 OF 1



5-7

NOTES: UNLESS OTHERWISE SPECIFIED

DELTA DESIGN INC.

TITLE: CHAMBER ASSY, MODEL 7650

ERN 4157 L 3

DRAFTED W BALL

SIZE E

1655 700

SCALE FL

DELTA DESIGN INC. 3775 KEARNY VILLA RD. SAN DIEGO, CA. 92123

ITEM NO.	ASSY. & QTY. -001	-002	-003	-004	-005	PART OR STOCK NUMBER	DESCRIPTION	MATERIAL	FAB CODE	REF DES	ZONE
00	X				1	1655700-001	CHAMBER ASSY MODEL 7650, 240V				
00											
00											
00											
00											
01	REF					1637889	SCHEMATIC DIAGRAM 240V, 3	WIRE			
02	REF					1637888	SCHEMATIC DIAGRAM 208V, 4	WIRE			
03	REF					1698610	SCHEMATIC DIAGRAM 208V, 3	WIRE			
04											
05											
06	2				2	1655682-101	HINGE HALF				
07	2					1652911-101	PLATE, BLOWER TRIM				
08	1				1	1655662-001	INNERLINER ASSY				
09	1				1	1655670-001	CHASSIS ASSY. ELECTRICAL				
10											
11	1				1	1655681-101	PIN, HINGE, SHORT				
12	1				1	1655681-102	PIN, HINGE, LONG				
13	1				1	1655683-101	PANEL, FRONT				
14											

REV	ECN	DATE	BY	APPD	NOTES

BY	N. BALL	5-26-3	NEXT ASSY.
CHK			END ITEM
APPD			
MODEL	7650 CHAMBER		
DESCRIPTION	CHAMBER ASSY, 7650		
P/L	1655700	REV N/C	SHT 1 OF 6

DELTA DESIGN INC. 5775 KEARNY VILLA RD. SAN DIEGO, CA. 92123

ITEM NO.	ASSY. & QTY. -001	-002	-003	-004	-005	PART OR STOCK NUMBER	DESCRIPTION	MATERIAL	FAB CODE	REF DES	ZONE
15	1				1	16555684-101	PANEL, REAR				
16											
17	1				1	16555685-101	PANEL, SIDE L/H				
18	1				1	16555686-101	PANEL, SIDE R/H				
19	1				1	16555687-101	PANEL, TOP				
20	1				1	16555688-001	PANEL, BOTTOM				
21	1				1	16555689-101	FRAME, FRONT PNL				
22	1				1	16555690-101	COVER, SOLENOID				
23	2				1	16555691-101	COVER BLANK				
24	1				1	16555692-101	COVER, FAILSAFE				
25	1				1	16555693-101	COVER				
26	1				1	16555699-101	BAFFLE PL., VENT				
27	1				1	16555695-101	COVER, VENT				
28	1				1	16555696-101	DIAPHRAM, VENT				
29											
30											
31	1					1635605-101	KEEPER				
32											
33	1					1600012-	NULL COVER				
34	A/R					1600091-101	SHIM, KEEPER				
35	A/R					1600091-102	SHIM, KEEPER				
36	1					1600409-	PROGRAM PLUG ASSY				
37											
38											
39											
40											

NOTES

P/L 1655700 REV SHT 2 OF 6

DELTA DESIGN INC. 5775 KEARNY VILLA RD. SAN DIEGO, CA. 92123

ITEM NO.	ASSY. & QTY. -001	-002	-003	-004	-005	PART OR STOCK NUMBER	DESCRIPTION	MATERIAL	FAB CODE	REF DES	ZONE
41	1					1635610-101	SPACER, DOOR KEEPER				
42											
43											
44	1					K0559604-101	PANEL LINE CORD & CIRCUIT BREAKER				
45											
46	1					1500077	STRAIN RELIEF, 240V				
47											
48											
49	1					1400002	CIRCUIT BREAKER				
50	1					1900082	LAMP ASSY, NEON				
51	1					1400509	TERMINAL BLOCK				
52	1					1400512	TERMINAL BLOCK				
53	6					1500419	FOOT				
54	1					1500077	BUSHING, STRAIN RELIEF				
55						1500078	BUSHING, STRAIN RELIEF				
56						1500184	WIRE NUT				
57						1500185	WIRE NUT				
58	A/R					1500394	POWER CABLE (8.5 FT.)				
59											
60	1					1500434	TAG, FAILSAFE				
61	1					1500450	EXTENSION				
62											
63	6					1700094	WASHER, FLAT 1/4 ID X 3/40 D				
64	2					1700362	SETSCREW, 8-32 X .19				
65	1					2000224	POWER PLUG, 240V				
66	1					1500026	GROMMET				

NOTES

P/L 165570D REV SHT 3 OF 6

DELTA DESIGN INC. 5775 KEARNY VILLA RD. SAN DIEGO, CA. 92123

ITEM NO.	ASSY. & QTY. -001	-002	-003	-004	-005	PART OR STOCK NUMBER	DESCRIPTION	MATERIAL	FAB CODE	REF DES	ZONE
67											
68											
69	1					2100632	FAN				
70											
71											
72	1					2300011	THERMOMETER				
73											
74	A/R					2900003	ADHESIVE/SEALER, RTV				
75	A/R					2400015	INSULATION, FIBERGLASS				
76											
77	1					3600081	PLUG, HOLE (BUTCH PLUG)				
78	1					3600080	PLUG HOLE (BUTCH PLUG)				
79	16					4100093	SPACER, 1/2 LONG				
80											
81											
82	4					6608010	WASHER, LOCK # 8-32				
83											
84	2						WASHER, LOCK 1/4 I.D.				
85											
86											
87											
88	16					6608000	WASHER, FLAT #8 I.D.				
89	4					6601400	WASHER, FLAT 1/4				
90											
91	4					6708320-000	NUT, HEX # 8-32				
92	5					6706320-001	NUT, HEX 6-32				

NOTES

P/L 1655700 REV SHT 4 OF 6

DELTA DESIGN INC. 5775 KEARNY VILLA RD. SAN DIEGO, CA. 92123

ITEM NO.	ASSY. & QTY. -001	-002	-003	-004	-005	PART OR STOCK NUMBER	DESCRIPTION	MATERIAL	FAB CODE	REF DES	ZONE
93						681032-001	FLT HD MS 10-32X1				
94	8					6806321-204	PAN HD MS 6-32X1/2				
95	3					6810321-204	PAN HD MS 10-32X1/2				
96	8					6806321-804	PAN HD MS 6-32X1/8				
97	24					6808321-404	PAN HD MS 8-32X1/4				
98	6					6814203-907	HEX HD CAPSCR 1/4-20X3/4				
99	2					6810325-804	PAN HD MS 10-32X5/8				
100	4					6806321-404	PAN HD MS 6-32X1/4				
101	90					6904122-100	FLT HD SH STL #4X1/2				
102	16					6906102-400	PAN HD SH STL #6X1				
103	60					6908582-200	OVAL HD SH STL #8X5/8				
104	4					6906582-400	PAN HD SH STL #6X5/8				
105						6906382-404	PAN HD SH STL 6X3/8				
106	4					6808321-204	PAN HD MS #8-32X1/2				
107	4					6806325-804	PAN HD MS #6-32X5/8				
108											
109											
110											
112											

NOTES

P/L 1655700 REV SHT 5 OF 6

DELTA DESIGN INC. 5775 KEARNY VILLA RD. SAN DIEGO, CA. 92123

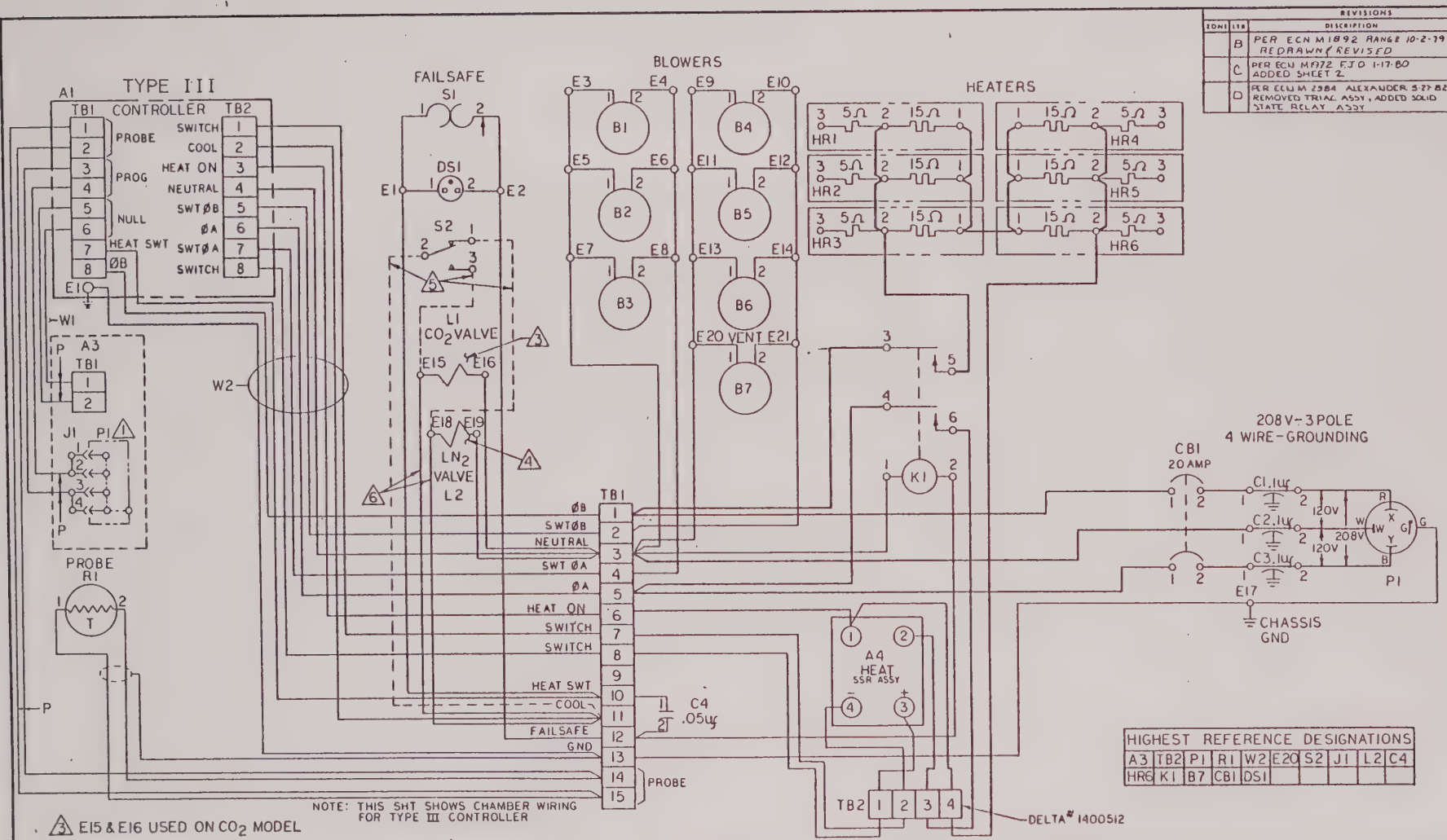
ITEM NO.	ASSY. & QTY. -001	-002	-003	-004	-005	PART OR STOCK NUMBER	DESCRIPTION	MATERIAL	FAB CODE	REF DES	ZONE
							OPTIONAL EQUIPMENT				
00											
00											
00											
00											
00											
00	REF					1655698-001	KIT, 208 VAC, 4 WIRE PWR				
00	REF					1655698-002	KIT, 208 VAC, 3 WIRE PWR				
00											
00	REF					1655967-001	KIT, COOLING, CO_2 HI-PRESS W/	TYPE V			
00	REF					1655968-001	KIT, COOLING, CO_2 LOW-PRESS W/	TYPE V			
00											
00	REF					1655972-001	KIT, COOLING, CO_2 HI-PRESS W/	TYPE III			
00	REF					1655973-001	KIT, COOLING, CO_2 LOW-PRESS W/	TYPE III			
00											
00	REF					1655970-006	KIT, COOLING, CO_2 HI-PRESS & LN_2 W/	TYPE V			
00	REF					1655971-006	KIT, COOLING, CO_2 LOW-PRESS & LN_2 W/	TYPE V			
00											
00	REF					1655975-006	KIT, COOLING, CO_2 HI-PRESS & LN_2 W/	TYPE III			
00	REF					1655976-006	KIT, COOLING, CO_2 LOW-PRESS & LN_2 W/	TYPE III			
00											
00	REF					1655969-001	KIT, COOLING, LN_2 ONLY W/	TYPE V			
00	REF					1655974-006	KIT, COOLING, LN_2 ONLY W/	TYPE III			

NOTES

P/L 1655700

REV NIC

SHT 6 OF 6



REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPD
	B	PER ECN M1892 RANGE 10-2-79 REDRAWN & REVISED	10-12-79	
	C	PER ECN M1972 EJO 1-17-80 ADDED SHEET 2.	1-17-80	
	D	PER ECO M 2384 ALEXANDER 5-27-82 REMOVED TRIAC ASSY, ADDED SOLID STATE RELAY ASSY	6-8-82	R. Alexander

HIGHEST REFERENCE DESIGNATIONS										
A3	TB2	P1	R1	W2	E20	S2	J1	L2	C4	
HR6	K1	B7	CB1	DS1						

NOTE: THIS SHT SHOWS CHAMBER WIRING FOR TYPE III CONTROLLER

3 E15 & E16 USED ON CO_2 MODEL

~~4 FINISH (IF APPLICABLE)~~

2 THICK LINES INDICATE HEAT POWER CIRUIT

~~5 MATL (IF APPLICABLE)~~

1 CAUTION DO NOT REMOVE P1 UNLESS A PROGRAMMER IS TO BE INSTALLED

6 E15 TO TB1-11 & E18 TB1-11 DISCONNECTED AND NOT USED ON CO_2 OR LN_2 MODEL

5 S2 USED ON CO_2 & LN_2 MODEL

4 E18 & E19 USED ON LN_2 MODEL

NOTES: UNLESS OTHERWISE SPECIFIED

5-14

DASH NO	QTY	NEXT ASSY	USED ON	SERIAL NO.	DATE EFF	DWG REV	MATERIAL	FINISH
APPLICATION				EFFECTIVITY				

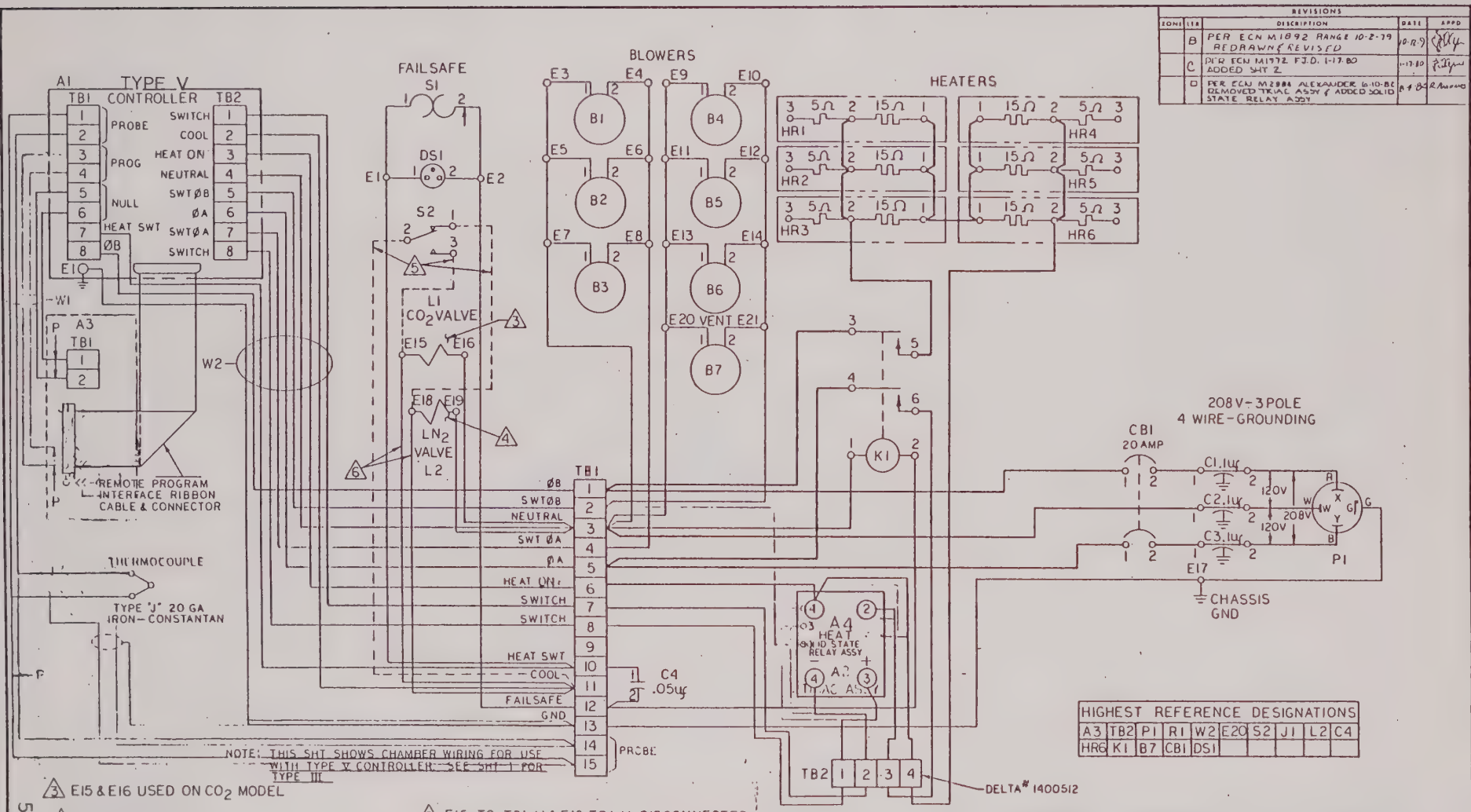
ENGINEERING ACTIVITY	
ECN M388	
DESIGN	HUTTON 11-29-78
DRAFTED	RANGE 10-2-79
CHECKED	HUTTON 5-8-79
APPROV	HARRIS 5-15-79
RELEASE	
DO NOT SCALE DWG	

DELTA DESIGN INC.
A SUBSIDIARY OF GENRAD INC.
SAN DIEGO, CA 92138

TITLE: SCHEMATIC DIAGRAM 208V W/CO_2 & LN_2 OPTION

SIZE	CODE IDENT		REV
D		1637888	D
SCALE ——		SHEET 1 OF 2	

BLUE CARD



HIGHEST REFERENCE DESIGNATIONS									
A3	TB2	P1	R1	W2	E20	S2	J1	L2	C4
HR6	K1	B7	CB1	DS1					

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPD
	B	PER ECN M1892 RANGE 10-2-79 REDRAWN & REVISED	10-2-79	
	C	PER ECN M1972 F.J.D. 1-17-80 ADDED SHT 2	1-17-80	
	D	PER ECN M2986 ALEXANDER 6-10-82 REMOVED TRIAC ASSY & ADDED SOLID STATE RELAY ASSY	6-10-82	

3 E15 & E16 USED ON CO_2 MODEL

2 THICK LINES INDICATE HEAT POWER CIRUIT

1 CAUTION: DO NOT REMOVE P1 UNLESS A PROGRAMMER IS TO BE INSTALLED

6 E15 TO TB1-11 & E18 TB1-11 DISCONNECTED AND NOT USED ON CO_2 OR LN_2 MODEL

5 S2 USED ON CO_2 & LN_2 MODEL

4 E18 & E19 USED ON LN_2 MODEL

NOTES: UNLESS OTHERWISE SPECIFIED

ENGINEERING ACTIVITY	ECN M388
DESIGN	HUTTON 11-29-78
DRAFTED	RANGE 10-2-79
CHECKED	HUTTON 5-8-73
APPROV	HARRIS 5-15-73
RELEASE	
DO NOT SCALE DWG	

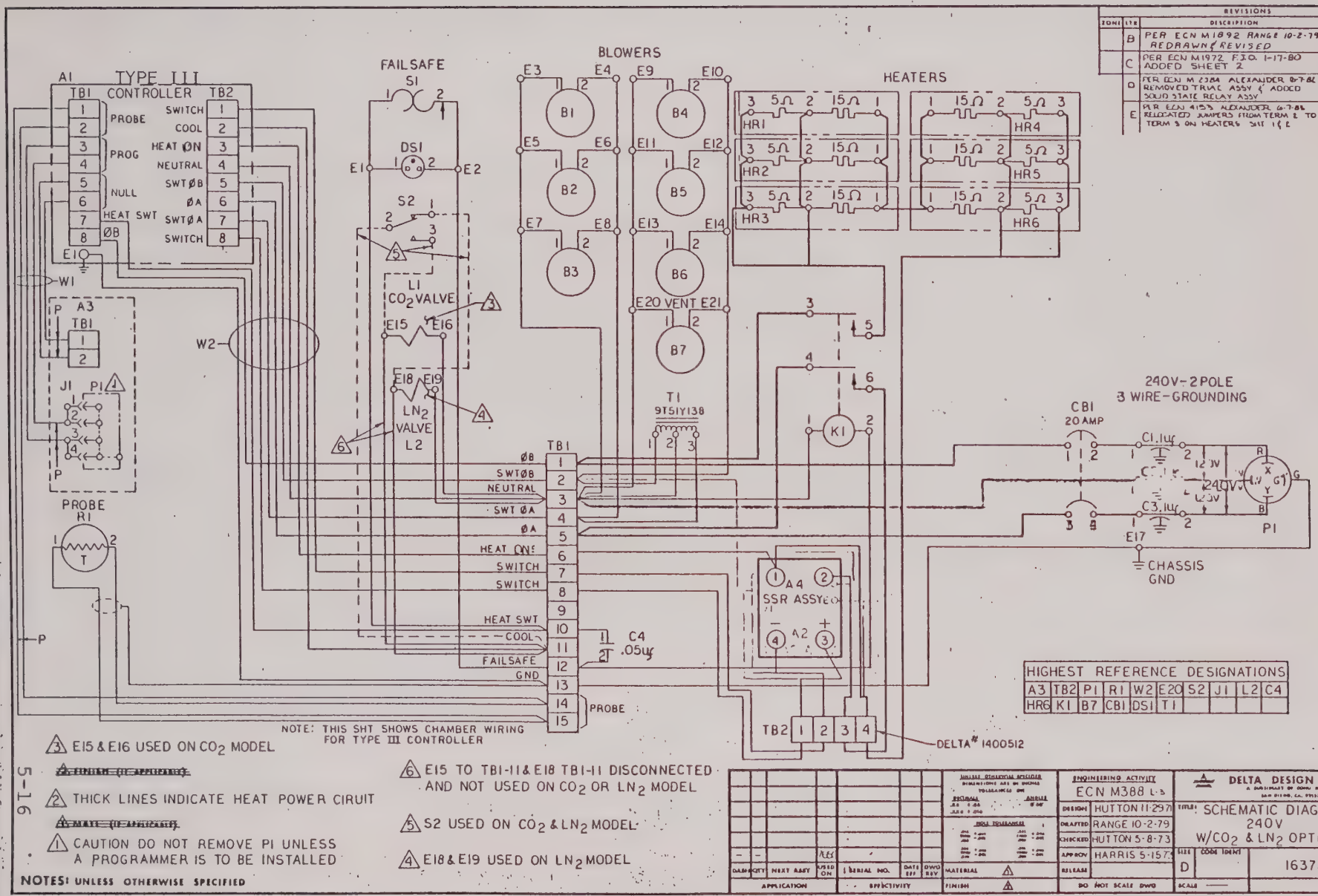
DELTA DESIGN INC.

TITLE: SCHEMATIC DIAGRAM 208V W/CO_2 & LN_2 OPTION

SIZE D | CODE IDENT | 1637888 | REV D

SCALE —— | SHEET 2 OF 2

5-15



REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPD
	B	PER ECN M1892 RANGE 10-2-79 REDRAWN/REVISED	10-12-79	
	C	PER ECN M1972 F.I.O. 1-17-80 ADDED SHEET 2	1-17-80	
	D	PER ECN M2384 ALEXANDER 8-7-82 REMOVED TRIAC ASSY & ADDED SOLID STATE RELAY ASSY	8-9-82	
	E	PER ECN 4153 ALEXANDER 6-7-85 RELOCATED JUMPERS FROM TERM 2 TO TERM 3 ON HEATERS SHT 1 & 2	6-19-85	

HIGHEST REFERENCE DESIGNATIONS										
A3	TB2	P1	R1	W2	E20	S2	J1	L2	C4	
HR6	K1	B7	CB1	DS1	T1					

3 E15 & E16 USED ON CO_2 MODEL

2 THICK LINES INDICATE HEAT POWER CIRUIT

1 CAUTION DO NOT REMOVE P1 UNLESS A PROGRAMMER IS TO BE INSTALLED

6 E15 TO TBI-11 & E18 TBI-11 DISCONNECTED AND NOT USED ON CO_2 OR LN_2 MODEL

5 S2 USED ON CO_2 & LN_2 MODEL

4 E18 & E19 USED ON LN_2 MODEL

NOTES: UNLESS OTHERWISE SPECIFIED

ENGINEERING ACTIVITY: ECN M388 L-3

DESIGN: HUTTON 11-29-79
DRAFTED: RANGE 10-2-79
CHECKED: HUTTON 5-8-73
APPROV: HARRIS 5-15-73
RELEASE:

DELTA DESIGN INC.

TITLE: SCHEMATIC DIAGRAM 240V W/CO_2 & LN_2 OPTION

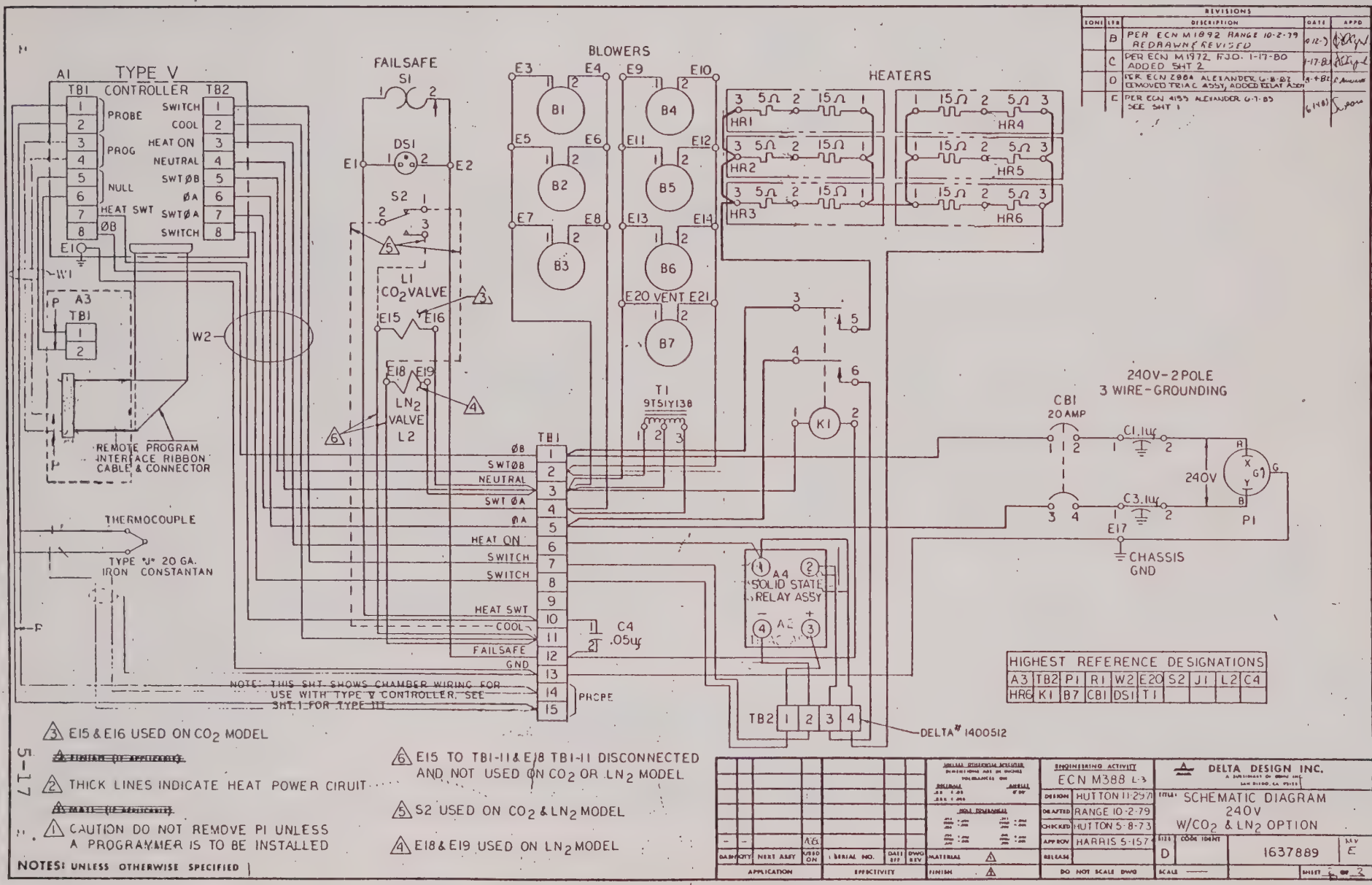
SIZE: D | CODE IDENT | 1637889 | REV: E

SCALE: — | SHEET 1 OF 2

DO NOT SCALE DWG

BLUE CARD

5-16



REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPD
	B	PER ECN M1892 RANGE 10-2-79 REDRAWN/REVISED	9-12-79	
	C	PER ECN M1972 RJO. 1-17-80 ADDED SHT 2	1-17-80	
	D	PER ECN 2984 ALEXANDER 6-8-82 REMOVED TRIAC ASSY, ADDED RELAY ASSY	6-8-82	
	E	PER ECN 4155 ALEXANDER 6-1-83 SEE SHT 1	6-1-83	

HIGHEST REFERENCE DESIGNATIONS									
A3	TB2	P1	R1	W2	E20	S2	J1	L2	C4
HR6	K1	B7	CB1	DS1	T1				

3 E15 & E16 USED ON CO_2 MODEL

4 TYPICAL (IF APPLICABLE)

2 THICK LINES INDICATE HEAT POWER CIRUIT

5 MATL (IF APPLICABLE)

1 CAUTION DO NOT REMOVE P1 UNLESS A PROGRAMMER IS TO BE INSTALLED

6 E15 TO TBI-11 & E18 TBI-11 DISCONNECTED AND NOT USED ON CO_2 OR LN_2 MODEL

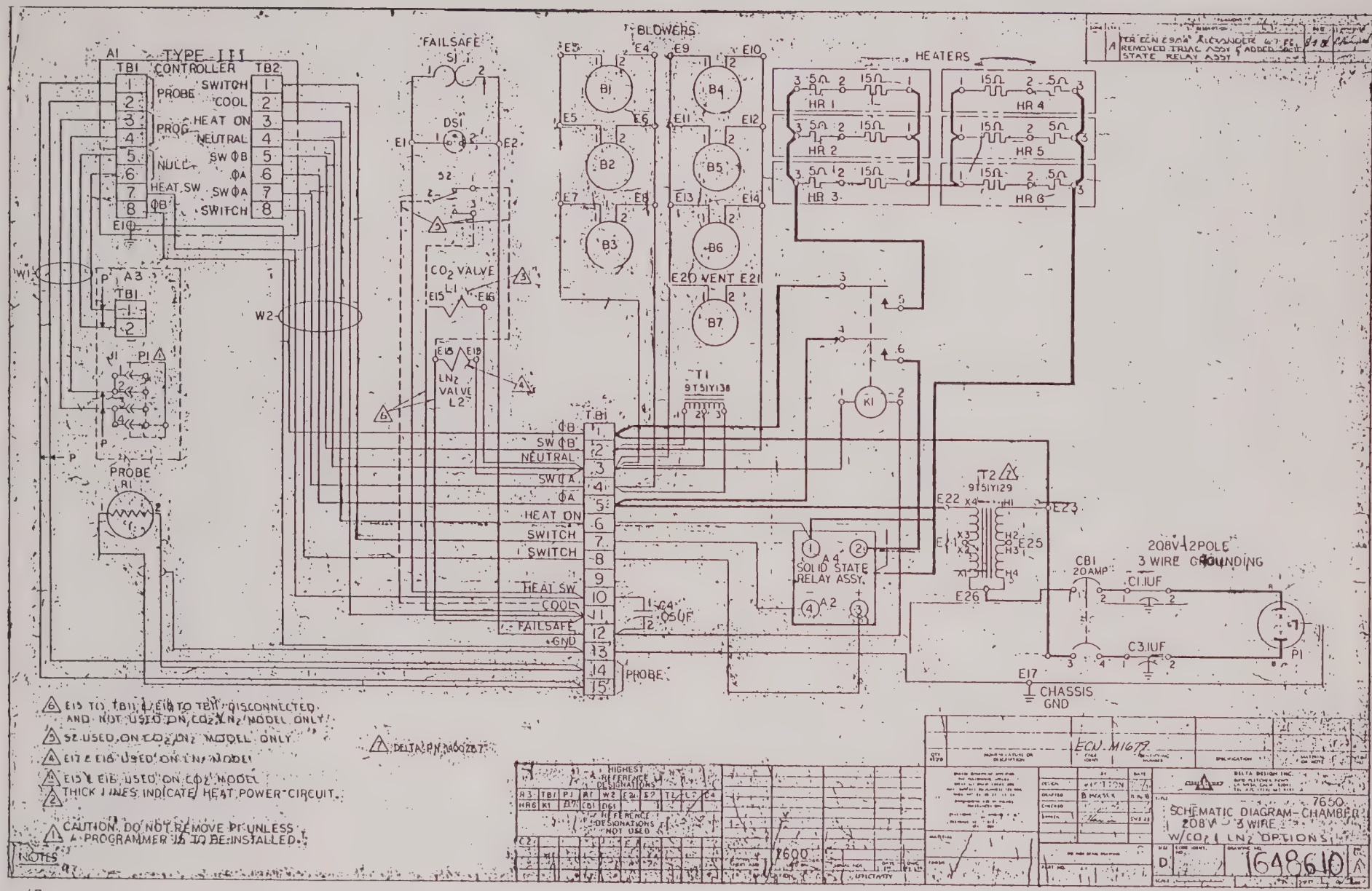
5 S2 USED ON CO_2 & LN_2 MODEL

4 E18 & E19 USED ON LN_2 MODEL

NOTES: UNLESS OTHERWISE SPECIFIED

5-17

ENGINEERING ACTIVITY	ECN M388 L-3	DELTA DESIGN INC.	
DESIGN	HUTTON 11-29-79	TITLE: SCHEMATIC DIAGRAM 240V W/CO_2 & LN_2 OPTION	
DRAFTED	RANGE 10-2-79		
CHECKED	HUTTON 5-8-79		
APP'D QUAL	HARRIS 5-15-79	SIZE D	CODE IDENT
RELEASE		1637889	REV E
DO NOT SCALE DWG		SCALE —	SHEET 3 OF 3



⑥ E15 TO TB1-1, E18 TO TB1-7 DISCONNECTED AND NOT USED ON CO2/LN2 MODEL ONLY.

⑤ S2 USED ON CO2/LN2 MODEL ONLY.

④ E17 & E18 USED ON LN2 MODEL

③ E15 & E18 USED ON CO2 MODEL

② THICK LINES INDICATE HEAT POWER CIRCUIT.

① CAUTION: DO NOT REMOVE P1 UNLESS PROGRAMMER IS TO BE INSTALLED.

NOTES

△ DELTA P.N. 166026

HIGHEST REFERENCE DESIGNATIONS

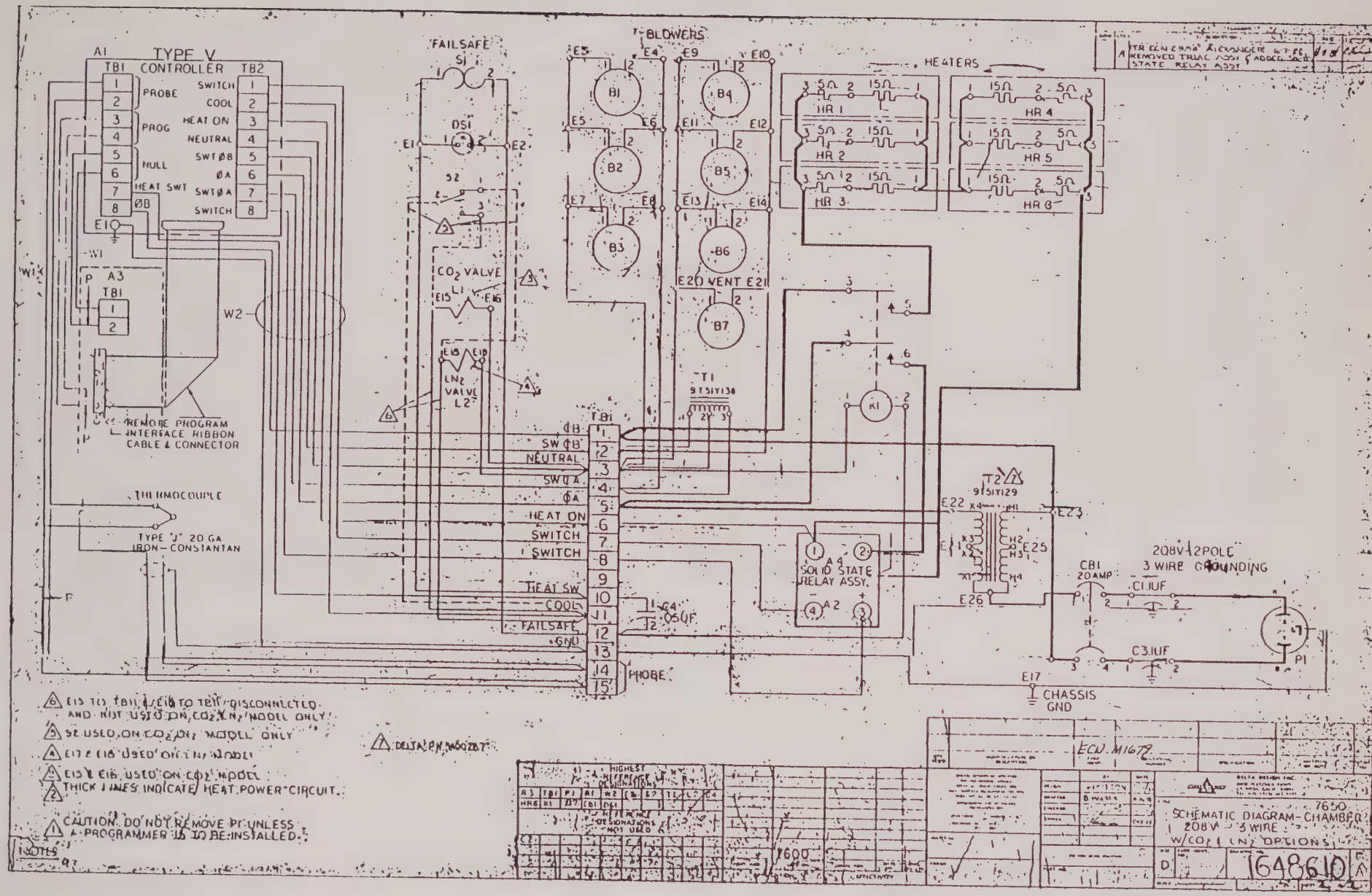
REFERENCE DESIGNATIONS NOT USED

ECN. M1677

7650 SCHEMATIC DIAGRAM-CHAMBER 208V 3 WIRE W/CO2 LN2 OPTIONS

D 1648610

5-18



5 E15 TO TB1 1, E16 TO TB1 2 DISCONNECTED AND NOT USED ON CO2 LN2 MODEL ONLY.

5 S2 USED ON CO2 LN2 MODEL ONLY

4 E17 & E18 USED ON LN2 MODEL

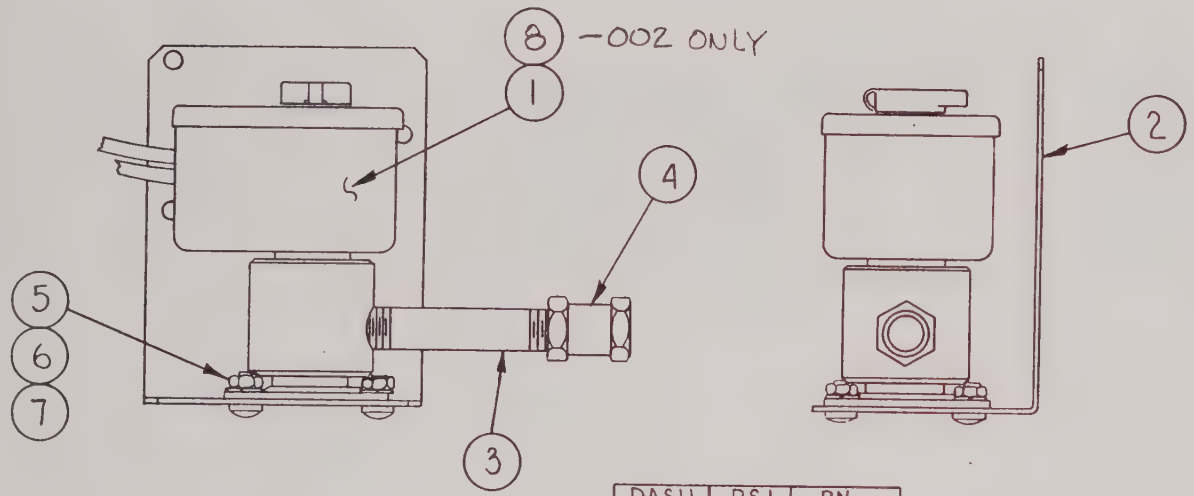
3 E15 & E16 USED ON CO2 MODEL

2 THICK LINES INDICATE HEAT POWER CIRCUIT.

1 CAUTION: DO NOT REMOVE PROM UNLESS A PROGRAMMER IS TO BE INSTALLED.

NOTES

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPD
	A	ECN M1862 RANGE 8-6-79 REVERSED SCREWS & NUTS	8-7-79	
	B	PER ECN 3676 ALEXANDER 2-28-83 (116 PARTS LIST ONLY	2-28-83	



DASH	PSI	PN
-001	900	1800117
-002	300	1800105

5-20

⚠ FINISH (IF APPLICABLE)

⚠ MATL (IF APPLICABLE)

NOTES: UNLESS OTHERWISE SPECIFIED

DASH	QTY	NEXT ASSY	USED ON
		1650571	2551A
			2201A
		MULTI-USAGE	

APPLICATION

SERIAL NO. | DATE EFF | DWG REV

EFFECTIVITY

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS: .XX ± .03, .XXX ± .010
ANGLES: 0° 30'

HOLE TOLERANCES
.013 THRU .125 +.004 -.001
.126 THRU .249 +.005 -.001
.250 THRU .500 +.006 -.001
.501 THRU .750 +.006 -.001

MATERIAL ⚠1
FINISH ⚠2

ENGINEERING ACTIVITY: ECN M1365

DESIGN	
DRAFTED	BGM 3-24-78
CHECKED	
APPROV	
RELEASE	
DO NO SCALE DWG	

DELTA DESIGN INC.
A SUBSIDIARY OF CONU INC.
SAN DIEGO, CA. 92123

TITLE: CO_2 VALVE & BRACKET ASS'Y

SIZE	CODE IDENT		REV
B		1647407	B
SCALE 1/1		SHEET 1 OF 1	

BLUE CARD

PL 1647407 REV B SHT 1 OF 1

DESCRIPTION CO2 VALVE & BRACKET ASSY

NEXT ASSY MULTI-USAGE BY [illegible] CK'D ____ APPD ____

REV	ECN	DATE	BY	APP
B	36216	2-23-73	RA	[illegible]

DELTA DESIGN
5725 KEARNY VILLA RD
SAN DIEGO, CALIF

JOB NO. ____ S.O. NO ____
QTY ____ PROM DATE ____ ACT ____
RUN * ____ MACH ____

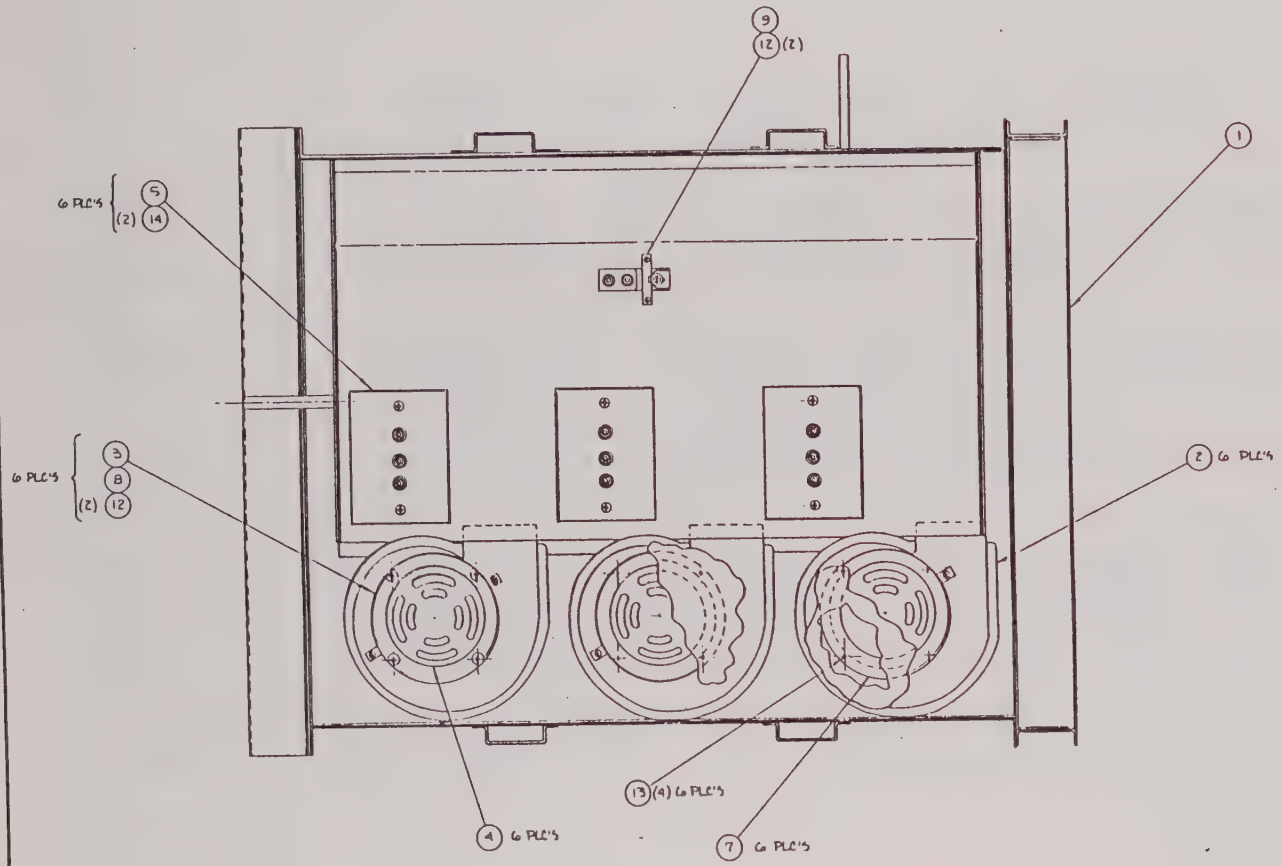
ITEM NO	ASSY & QTY -001	-002	-003	-004	INDENTURE	SIZE	DRAWING NO.	REV	DESCRIPTION	MFG OR MFG NO.	STOCK OR PART NO.
00	X					P	1647407		CO2 VALVE & BRACKET ASSY (900 PSI)		1647407-001
00		X				B	1647407		CO2 VALVE & BRACKET ASSY (300 PSI)		1647407-002
00											
00											
00											
00											
00											
00											
01	1								SOLENOID VALVE (1000 PSI)	ASCO 8264 D9	1800117
02	1	1					B1645008		BRACKET CO2		1645008-101
03	1	1							NIPPLE BRASS - 1/8 NPT X 2.00		3601038
04	1	1							COUPLING, 1/8 NPT		3600102
05	1	1							*8-32 X 3/8 PHP-MS		6808323-804
06	1	1							*8 SPLIT LOCKWASHER		6608010
07	1	1							*8-32 HEX NUT		6708320-000
08		1							SOLENOID VALVE (300 PSI)	ASCO 8264 D10	1800105

JOB QTY	AUL	QTY REC	FAB CD	PURCHASING P.O. NO	QTY	DUE	REC	MANUFACTURE ACT STD HRS	EST ACT COM	COM	PLATE/PAINT IN	OUT	AREA

NOTES:

P/L 1647407 REV B

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPD



FRONT OF CHAMBER →

SEE SEPARATE "A" SIZE PARTS LIST, P/L 16555602

⚠ FINISH (IF APPLICABLE)

⚠ MATL (IF APPLICABLE)

5-22

NOTES: UNLESS OTHERWISE SPECIFIED

DASH	QTY	NEXT ASSY	USED ON
001	1	16555700	A-50

APPLICATION

SERIAL NO. | DATE EFF | DWG REV

EFFECTIVITY

MATERIAL ⚠

FINISH ⚠

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON DECIMALS .XX ± .03, .XXX ± .010; ANGLES ± 30'; MFG TOLERANCES .010 ± .005, .005 ± .005, .000 ± .005, .XXX ± .005, .XXX ± .005, .000 ± .005

ENGINEERING ACTIVITY	ERN 4157 L-3
DESIGN	
DRAFTED	ALEXANDER
CHECKED	
APPROV	
RELEASE	

DO NOT SCALE DWG

DELTA DESIGN INC.
A SUBSIDIARY OF CONIC INC.
SAN DIEGO, CA. 92123

TITLE: INNERLINER ASSY, MODEL 7650

SIZE	CODE IDENT		REV
D		16556602	H/C

SCALE 1/2 SHEET 1 OF 1

DELTA DESIGN INC. 10775 KEARNY VILLA RD. SAN DIEGO, CA. 92123

ITEM NO.	ASSY. & QTY. -001	-002	-003	-004	-005	PART OR STOCK NUMBER	DESCRIPTION	MATERIAL	FAB CODE	REF DES	ZONE
	X					16556602-001	INNERLINER ASSY, 7650				
00											
00											
00											
00											
01	1					16556060-001	INNERLINER WELDMENT				
02	6					26356006-001	SCROLL, BLOWER				
03	6					26321906-001	CAN ASSY				
04	6					26210006-001	MOTOR ASSY, BLOWER				
05	6					26225 27-001	HEATER ASSY				
06											
07	6					1500734	RING, BLOWER, SCROLL				
08	6					1500026	GROMMET				
09	1					1400160	THERMAL SWITCH				
10	A/R					2400003	RTV, RED				
11											
12	14					6906140-400	SCREW #6-32 x 1/4 SMS-PH				
13	24					6906380-400	SCREW #6-32 x 3/8 SMS-PH				
14	12					6806323-804	SCREW #6-32 x 3/8 MS-PH				
15											

REV	ECN	DATE	BY	APPD
n/c				

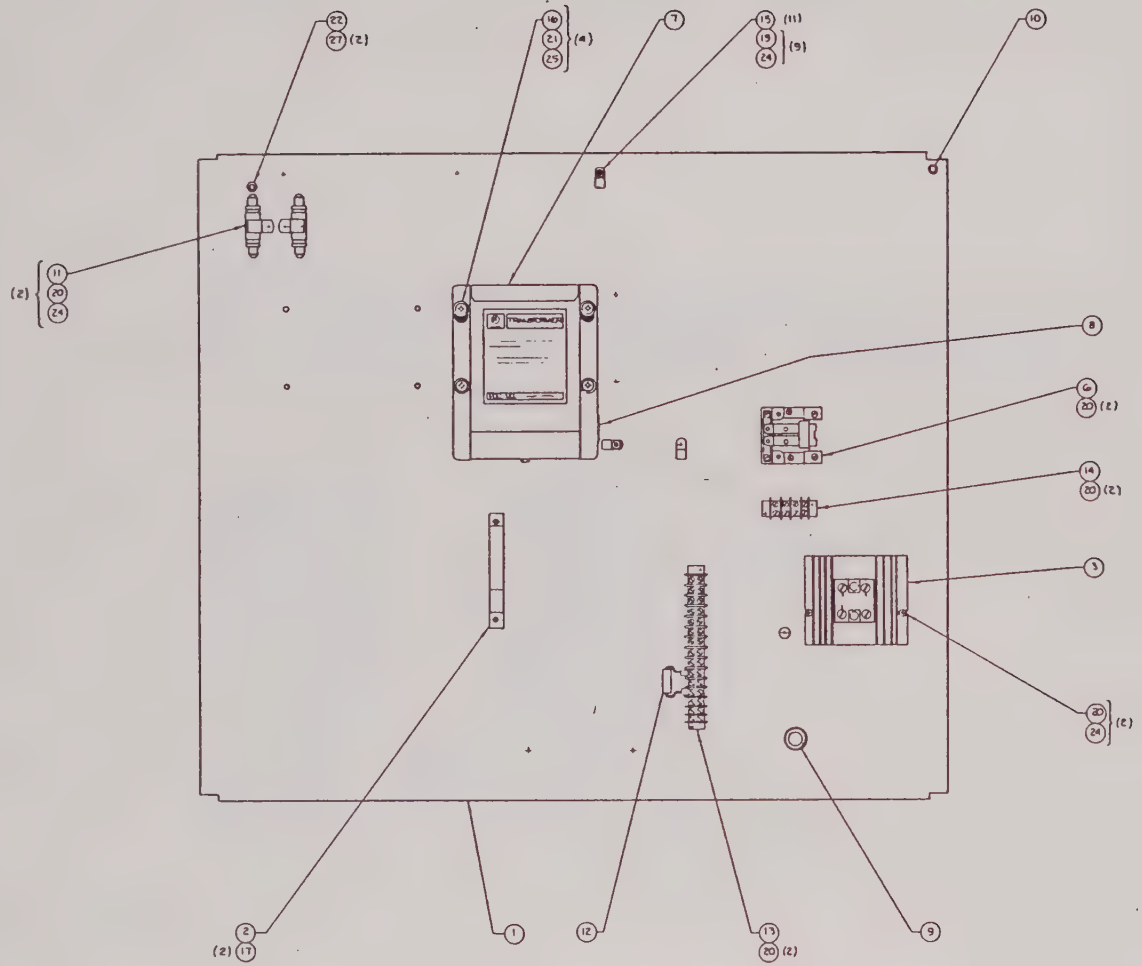
NOTES

BY	ALEXANDER	6-6-83	NEXT ASSY.
CHK			16555700
APPD			

MODEL 7650 CHAMBER

DESCRIPTION
INNERLINER ASSY

P/L 16556602 | REV NIC | SHT 1 OF 1



5-24

⚠ FINISH (IF APPLICABLE)

⚠ MATL (IF APPLICABLE)

NOTES: UNLESS OTHERWISE SPECIFIED

SEE SEPARATE PARTS LIST PL K055670

DELTA DESIGN INC. 5775 KEARNY VILLA RD. SAN DIEGO, CA. 92123

ITEM NO.	ASSY. & QTY. -001	-002	-003	-004	-005	PART OR STOCK NUMBER	DESCRIPTION	MATERIAL	FAB CODE	REF DES	ZONE
	X					16555670-001	CHASSIS ASSY, ELEC.				
00											
00											
00											
00											
00											
01	1					16555671-101	CHASSIS, ELEC.				
02	1					16000005-101	BRACKET, CONTROLLER				
03	1					1654248-001	RELAY ASSY, SOLID STATE				
04											
05											
06	1					1400218	RELAY				
07	1					1400337	TRANSFORMER				
08	1					1500032	GROMMET				
09	1					1500033	GROMMET				
10	1					1500028	GROMMET				
11	2					0800007	CAPACITOR				
12	1					0700520-400	CAPACITOR				
13	1					1400572	TERM. BLOCK				
14	1					1400513	TERM. BLOCK				

REV	ECN	DATE	BY	APPD
N/C	4157	6-8-83	R.A.	

NOTES

BY	ALEXANDER	6-2-83	NEXT ASSY.
CHK			1655700
APPD			

MODEL 7650 CHAMBER

DESCRIPTION
CHASSIS ASSY, ELEC.

P/L 16555670 | REV N/C | SHT 1 OF 2

DELTA DESIGN INC. 5775 KEARNY VILLA RD. SAN DIEGO, CA. 92123

ITEM NO.	ASSY. & QTY. -001	-002	-003	-004	-005	PART OR STOCK NUMBER	DESCRIPTION	MATERIAL	FAB CODE	REF DES	ZONE
15	11					1500004	CLAMP				
16	4					1501590-132	RIVNUT, #10, STEEL				
17	2					1700051	RIVET				
18											
19	9					6906120-400	SCREW, #6-32 x 1/2 PHP-SMS				
20	10					6906580-400	SCREW, #6-32 x 5/8 PHP-SMS				
21	4					6810321-204	SCREW, #10-32 x 1/2 PH-MS				
22	1					6806321-204	SCREW, #6-32 x 1/2 PH-MS				
23											
24	13					6606000	WASHER, FLAT #6-32				
25	4					6610000	WASHER, FLAT #10-32				
26											
27	2					6706320-000	NUT, HEX, #6-32				

NOTES

P/L 1655670

REV NIC

SHT 2 OF 2

5-26

DELTA DESIGN INC. 5775 KEARNY VILLA RD. SAN DIEGO, CA. 92123

ITEM NO.	ASSY. & QTY. -001	-002	-003	-004	-005	PART OR STOCK NUMBER	DESCRIPTION	MATERIAL	FAB CODE	REF DES	ZONE
00	X					1655698-001	KIT, 208 VAC, 4 WIRE PWR				
00		X				1655698-002	KIT, 208 VAC 3 WIRE PWR				
00											
00											
00											
00	REF	—				1637888	SCHEMATIC DIAGRAM · 208V (4 WIRE)				
00	—	REF				1648610	SCHEMATIC DIAGRAM - 208 V (3 WIRE)				
01	—	1			1	1655964-102	PANEL, LINE CORD AND CIR. BRKR				
02											
03											
04	1	—				1400287	TRANSFORMER				
05	—	1				1400059	CIRCUIT BREAKER				
06	—	1				1500079	BUSHING, STRAIN RELIEF				
07	—	1				1500395	LINE CORD 8.5 FT LONG				
08	—	1				2000132	PLUG, PWR				
09											
10											

REV	ECN	DATE	BY	APPD
N/C	9115	6-9-3		

NOTES

RE-STOCK ITEMS REMOVED FROM CHAMBER ASSY.

BY	N. BALL	6-7-3	NEXT ASSY.
CHK			PER SALES ORDER
APPD			

MODEL 7650 OPTION

DESCRIPTION KIT, 208 VAC POWER OPTION

P/L 1655698 REV N/C SHT 1 OF 1

5-27

DELTA DESIGN INC. 3175 KEARNY VILLA RD. SAN DIEGO, CA. 92123

ITEM NO.	ASSY. & QTY. -001	-002	-003	-004	005	PART OR STOCK NUMBER	DESCRIPTION	MATERIAL	FAB CODE	REF DES	ZONE
00	X					1655967-001	KIT, COOLING CO_2, 7650, 2300				
00		X				1655967-002	" " " 2850				
00			X			1655967-003	" " " 3900				
00				X		1655967-004	" " " 5900				
00					X	1655967-005	KIT, COOLING CO_2, 6400				
01	1	1	1	1	1	2618020-001	CO_2 HOSE ASSY				
02	1	1	1	1	1	1697407-001	VALVE, SOLENOID 900 PSI				
03	1	-	-	-	-	2618004-001	INJECTOR				
04	-	1	-	-	-	2618004-010	INJECTOR				
05	-	-	-	1	-	2618004-007	INJECTOR				
06	-	-	1	-	-	2618003-001	INJECTOR				
07	-	-	-	-	1	2618003-005	INJECTOR				
08											
09											
10											
11											
12											
13											
14											
15											

REV	ECN	DATE	BY	APPD
N/C	9115	6-9-3		

NOTES

N/A INFO
-001 USED AN 7650, 2300
-002 " " 2850
-003 " " 5900
-004 " " 3900
-005 " " 6400

BY	N. BALL	5-31-3	NEXT ASSY.
CHK			SEE NOTES
APPD			

MODEL SEE NOTES

DESCRIPTION KIT, COOLING, CO_2 HIGH PRESS. W/TYPE II

P/L 1655967 REV N/C SHT 1 OF 1

5-28

DELTA DESIGN INC. 9775 KEARNY VILLA RD. SAN DIEGO, CA. 92123

ITEM NO.	ASSY. & QTY. -001	-002	-003	-004	005	PART OR STOCK NUMBER	DESCRIPTION	MATERIAL	FAB CODE	REF DES	ZONE
00	X					1655968-001	KIT, COOLING, CO_2, (7650, 5900, 2300)				
00		X				-002	" " " (2850)				
00			X			-003	" " " (3900)				
00				X		-004	KIT, COOLING, CO_2, (6400)				
00											
00											
01	1	1	1	1		2618020-001	HOSE ASSY				
02	1	1	1	1		1647407-002	VALVE, SOLENOID 300 PSI				
03	1	—	—	—		1697892-107	11" TUBE				
04	1	1	1	1		3600197	COUPLING				
05	—	1	—	—		1697892-115	28" TUBE				
06	—	—	1	1		1697892-108	INJECTOR				
07											
08											
09											
10											
11											
12											
13											
14											

REV	ECN	DATE	BY	APPD
NC	4115	6-9-3		WB.

NOTES

N/A INFO

-001 USED ON 7650, 5900, 2300

-002 " " 2850

-003 " " 3900

-004 " " 6400

BY	N. BALL	5-31-3	NEXT ASSY.
CHK			SEE NOTES
APPD			

MODEL

DESCRIPTION KIT, COOLING, CO_2 LOW PRESS. W/TYPE V

P/L 1655968 REV NC SHT 1 OF 1

DELTA DESIGN INC. 5775 KEARNY VILLA RD. SAN DIEGO, CA. 92123

ITEM NO	ASSY. & QTY. 001	002	003	004	005	PART OR STOCK NUMBER	DESCRIPTION	MATERIAL	FAB CODE	REF DES	ZONE
00	X					1655970-001	KIT, COOLING, CO_2/LN_2 (2300)				
00		X				-002	(2850)				
00			X			-003	(3900)				
00				X		-004	(5900)				
00					X	1655970-005	KIT, COOLING, CO_2/LN_2 (6400)				
00											
01	1	1	1	1	1	2618020-001	HOSE ASSY, CO_2				
02	1	1	1	1	1	1647407-001	VALVE, SOLENOID				
03	1	-	-	-	-	2618004-001	INJECTOR				
04	1	1	1	1	1	1643404-001	BRACKET				
05	1	1	1	1	1	1640207-001	VALVE				
06	1	-	-	-	-	2619066-001	INJECTOR				
07	1	1	1	1	1	1606104-101	TAG				
08	1	1	1	1	1	4200009	COVER				
09	1	1	1	1	1	4200010	BASE				
10	1	1	1	1	1	3600104	COUPLING				
11											
12											
13	1	1	1	1	1	1400110	FILTER				
14	1	1	1	1	1	1400192	SWITCH				

REV	ECN	DATE	BY	APPD
N/C	4115	6-9-3		

NOTES

001 USED ON 2300
002 " " 2850
003 " " 3900
004 " " 5900
005 " " 6400
006 " " 7650 (P/L SH 3)

BY	N. BALL	5-31-3	NEXT ASSY.
CHK			SEE NOTES
APPD			

MODEL SEE NOTES

DESCRIPTION KIT, COOLING, CO_2 HI-PRESS LN_2 W/ TYPE V

P/L 1655970 REV N/C SHT 1 OF 3

5-30

CD

DELTA DESIGN INC. 5775 KEARNY VILLA RD. SAN DIEGO, CA. 92123

ITEM NO.	ASSY. & QTY. -001	-002	-003	-004	-005	PART OR STOCK NUMBER	DESCRIPTION	MATERIAL	FAB CODE	REF DES	ZONE
15	–	1	–	–	–	2618004-010	INJECTOR				
16	–	–	1	–	–	2618003-001	INJECTOR				
17	–	–	–	1	–	2618004-007	INJECTOR				
18	–	–	–	1	–	2639145-001	INJECTOR				
19					1	2618003-005	INJECTOR				
20	–	1	–	–	–	2619067-001	INJECTOR				
21											
22	–	–	1	–	1	3600092	REDUCER				
23											

NOTES

P/L 1655970

REV NC

SHT 2 OF 3

5-31

DELTA DESIGN INC. 5775 KEARNY VILLA RD. SAN DIEGO, CA. 92123

ITEM NO	ASSY. & QTY. 6.00	00	00	00	00	PART OR STOCK NUMBER	DESCRIPTION	MATERIAL	FAB CODE	REF DES	ZONE
00	X					1655970-006	KIT, DUAL COOLING, (7650)				
00											
00											
00											
00											
00											
01	1					2618020-001	HOSE ASSY, CO2				
02	1					1647407-001	VALVE,				
03	1					2618004-001	INJECTOR				
04	2					164-3404-001	BRACKET				
05	2					1640207-001	VALVE				
06	2					2619067-001	INJECTOR				
07	1					1606104-101	TAG				
08	2					4200009	COVER				
09	2					4200010	BASE				
10	2					3600104	COUPLING				
11											
12											
13	2					1400110	FILTER				
14	1					1400192	SWITCH				

REV	ECN	DATE	BY	APPD

NOTES: SEE SH 1

BY / CHK / APPD

NEXT ASSY. SEE SH 1

MODEL

DESCRIPTION: SEE SH 1

P/L 1655970 REV N/C SHT 3 OF 3

DELTA DESIGN INC. 9775 KEARNY VILLA RD. SAN DIEGO, CA. 92123

ITEM NO.	ASSY. & QTY. 001	002	003	004	005	PART OR STOCK NUMBER	DESCRIPTION	MATERIAL	FAB CODE	REF DES	ZONE
00	X					1655971-001	KIT. DUAL COOLING (2300)				
00		X				-002	(2850)				
00			X			-003	(3900)				
00				X		-004	(5900)				
00					X	1655971-005	KIT. DUAL COOLING (6400)				
00											
01	1	1	1	1	1	2618020-001	HOSE ASSY, CO2				
02	1	1	1	1	1	1647407-002	VALVE				
03	1	—	—	1	—	1647842-107	INJECTOR, 11"				
04	1	1	1	1	1	1693409-101	BRACKET				
05	1	1	1	1	1	1640207-001	VALVE				
06	1	—	—	—	—	2619066-001	INJECTOR				
07	1	1	1	1	1	1606104-101	TAG				
08	1	1	1	1	1	4200009	COVER				
09	1	1	1	1	1	4200010	BASE				
10	1	1	1	1	1	3600104	COUPLING				
11	1	1	1	1	1	3600197	COUPLING				
12											
13											
14	1	1	1	1	1	1400110	FILTER				

REV	ECN	DATE	BY	APPD
N/C	4115	6-9-3		

NOTES:
-001 USED ON 2300
-002 " " 2850
-003 " " 3900
-004 " " 5900
-005 " " 6400
-006 " " 7650 (P/L SH 3)

BY	N. BALL	5-31-3	NEXT ASSY.
CHK			SEE NOTES
APPD			
MODEL			

DESCRIPTION: KIT. DUAL COOLING LQ-PRESS CO2 & LN2 W/TYPE V

P/L 1655971 | REV N/C | SHT 1 OF 3

DELTA DESIGN INC. 5775 KEARNY VILLA RD. SAN DIEGO, CA. 92123

ITEM NO.	ASSY. & QTY. -001	-002	-003	-004	-005	PART OR STOCK NUMBER	DESCRIPTION	MATERIAL	FAB CODE	REF DES	ZONE
15	1	1	1	1	1	1400192	SWITCH				
16	—	1	—	—	—	1647842-115	INJECTOR				
17	—	1	—	—	—	2619067-001	INJECTOR				
18	—	—	1	—	1	1647842-108	INJECTOR				
19											
20	—	—	—	1	—	1639145-001	INJECTOR				
21											
22											
23											
24											
25											
26											
27	—	—	1	—	1	3600092	REDUCER				

NOTES

P/L 1655971 REV M/C SHT 2 OF 3

DELTA DESIGN INC. 5775 KEARNY VILLA RD. SAN DIEGO, CA. 92123

ITEM NO.	ASSY. & QTY. -006	-00	-00	-00	-00	PART OR STOCK NUMBER	DESCRIPTION	MATERIAL	FAB CODE	REF DES	ZONE
00	X					1655971-006	KIT, DUAL COOLING (7650)				
00											
00											
00											
00											
00											
01	1					2618020-001	HOSE ASSY. CO2				
02	1					1647402-002	VALVE				
03	1					1647842-107	INJECTOR				
04	2					1643404-101	BRACKET				
05	2					1640207-001	VALVE				
06	2					2619067-001	INJECTOR				
07	1					1606104-101	TAG				
08	2					4200009	COVER				
09	2					4200010	BASE				
10	2					3600104	COUPLING				
11	1					3600197	COUPLING				
12											
13											
14	2					1400110	FILTER				
15	1					1400192	SWITCH				
16											
17											
18											
19											
20											

NOTES

P/L 1655971 REV N/C SHT 3 OF 3

DELTA DESIGN INC. 5775 KEARNY VILLA RD. SAN DIEGO, CA. 92123

ITEM NO.	ASSY. & QTY. -001	-002	-003	-004	-005	PART OR STOCK NUMBER	DESCRIPTION	MATERIAL	FAB CODE	REF DES	ZONE
00	X					1655974-001	KIT, COOLING, LN2 (2300)				
00		X				-002	(2850)				
00			X			-003	(3900)				
00				X		-004	(5900)				
00					X	1655974-005	KIT, COOLING, LN2 (6400)				
00											
01	1	1	1	1	1	1693404-001	BRACKET				
02	1	1	1	1	1	1640207-001	VALVE				
03	✓	—	—	—		2619066-001	INJECTOR				
04	—	1	—	—		2619067-001	INJECTOR				
05				1		2639145-001	INJECTOR				
06											
07											
08	1	1	1	1	1	4200009	COVER				
09	1	1	1	1	1	4200010	BASE				
10	1	1	1	1	1	3600104	COUPLING				
11	1	1	1	1	1	0500015	POT, 396 Ω				
12	1	1	1	1	1	0400018	RESISTOR, 26 Ω, ¼W				
13	1	1	1	1	1	1400110	FILTER				
14											

REV	ECN	DATE	BY	APPD
N/C	9115	6-9-3		MA

NOTES:
-001 USED ON 2300
-002 " " 2850
-003 " " 3900
-004 " " 5900
-005 " " 6400
-006 " " 7650 (SH 2)

BY	N. BALL	5-31-3	NEXT ASSY.
CHK			SEE NOTES
APPD			
MODEL			
DESCRIPTION	KIT, COOLING LN2 ONLY W/ TYPE III		
P/L	1655974	REV N/C	SHT 1 OF 2

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DELTA DESIGN INC. 5775 KEARNY VILLA RD. SAN DIEGO, CA. 92123

ITEM NO.	ASSY. & QTY. -006	-00	-00	-00	-00	PART OR STOCK NUMBER	DESCRIPTION	MATERIAL	FAB CODE	REF DES	ZONE
00	X					1655974-006	KIT, COOLING, LN2 (7650)				
01	2					1643404-001	BRACKET				
02	2					1640207-001	VALVE				
03	2										
04											
05											
06	2					2619067-001	INJECTOR				
07											
08	2					4200009	COVER				
09	2					4200010	BASE				
10	2					3600104	COUPLING				
11	1					0500015	POT, 396 Ω				
12	1					0400018	RESISTOR, 26 Ω, ¼ W				
13	2					1400110	FILTER				
14											
15											
16											

NOTES

P/L 1655974 REV N/C SHT 2 OF 2

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